SPATIALLY-ENCODED ANALYTE DETECTION

ABSTRACT OF THE DISCLOSURE

A flow-through microchannel (*e.g.* capillary) biosensor is described for the for the detection of multiple, different analytes (*e.g.* nucleic acids, proteins, sugars, *etc.*) targets in a sample by binding them to "complementary" binding partners (*e.g.* complementary nucleic acids, ligands, antibodies, *etc.*). The binding partners are immobilized in different sections of a microchannel (*e.g.* a fused silica capillary). After fabrication of the biosensor, a sample is flushed through the capillary, and any target analyte(s) contained within the sample are bound to the immobilized binding partner(s) on the microchannel wall forming bound complexes. Finally, the bound complexes are simultaneously denatured along the entire length of the capillary and flushed out past a detector poised downstream, and the analyte concentration is measured (*e.g.*, using sinusoidal voltammetry). Direct electrochemical detection of underivatized DNA is accomplished by oxidizing its sugar backbone and the amine containing nucleobase at the copper electrode. The elution time of the desorbed target DNA(s) is used for the sequence identification of the target. Multiple genetic sequences can be diagnosed by using a single biosensor in this manner. The sensor is highly specific due to hybridization chemistry, and extremely sensitive due to electrochemical detection.